

ABSTRAK

**RANCANG BANGUN MODUL *TRAINER* PEMBANGKIT LISTRIK
TENAGA SURYA (PLTS) SEBAGAI MEDIA PEMBELAJARAN DI
LABORATORIUM JURUSAN TEKNIK ELEKTRO
(2026 : 61 Halaman + 35 Gambar + 10 Tabel + Daftar Pustaka + Lampiran)**

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PROGRAM STUDI DIII TEKNIK ELEKTRONIKA

JURUSAN TEKNIK ELEKTRO

POLITEKNIK NEGERI SRIWIJAYA

Penelitian ini bertujuan untuk merancang dan membangun modul trainer Pembangkit Listrik Tenaga Surya (PLTS) sebagai media pembelajaran di Laboratorium Jurusan Teknik Elektro. Modul trainer terdiri dari panel surya monokristalin 100 Wp, Solar Charge Controller (SCC), baterai 12 V 50 Ah, inverter, serta beban AC dan DC. Metode penelitian meliputi studi literatur, perancangan, pembuatan, pengujian, dan analisis data. Pengujian dilakukan selama lima hari pada pukul 10.00–16.00 WIB dengan mengukur tegangan, arus, dan daya. Hasil pengujian menunjukkan bahwa sistem PLTS beroperasi sesuai rancangan dengan daya keluaran yang dipengaruhi oleh kondisi cuaca dan intensitas cahaya matahari. Daya rata-rata yang diperoleh sebesar 42,161 W, sedangkan kebutuhan energi beban sebesar 238,1 Wh per hari dapat dipenuhi oleh panel surya 100 Wp dan baterai 12 V 50 Ah. Hasil pengujian SCC menunjukkan tegangan pengisian maksimum 14,41 V dengan daya pengisian tertinggi 44,81 W, sementara inverter mampu mengonversi tegangan DC menjadi AC pada rentang 207–218 V untuk menyuplai berbagai beban listrik. Berdasarkan hasil penelitian, modul trainer PLTS berhasil direalisasikan dan layak digunakan sebagai media pembelajaran untuk membantu mahasiswa memahami sistem tenaga surya secara langsung.

Kata kunci: PLTS, modul trainer, energi terbarukan, media pembelajaran, Solar Charge Controller.

ABSTRACT

DESIGN AND DEVELOPMENT OF A SOLAR POWER PLANT (PLTS) TRAINER MODULE AS A LEARNING MEDIA IN THE ELECTRICAL ENGINEERING LABORATORY

(2026: 61 Pages + 35 Figures + 10 Tables + References + Appendices)

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STUDY PROGRAM OF ELECTRONIC ENGINEERING

ELECTRICAL ENGINEERING

SRIWIJAYA STATE POLYTECHNIC

This study aims to design and develop a Solar Power Plant (PLTS) trainer module as a learning medium in the Electrical Engineering Laboratory. The trainer module consists of a 100 Wp monocrystalline solar panel, a Solar Charge Controller (SCC), a 12 V 50 Ah battery, an inverter, and AC and DC loads. The research method includes literature study, system design, construction, testing, and data analysis. Testing was conducted for five days from 10:00 a.m. to 4:00 p.m. by measuring voltage, current, and power parameters. The results show that the PLTS system operated according to the design, with output power influenced by weather conditions and solar irradiance. The average power generated was 42.161 W, while the load energy requirement was 238.1 Wh per day, which could be supplied by the 100 Wp solar panel and 12 V 50 Ah battery. The SCC test results showed a maximum charging voltage of 14.41 V and a maximum charging power of 44.81 W. Meanwhile, the inverter successfully converted DC voltage into AC voltage within a range of 207–218 V to supply various electrical loads. Based on the results, the developed PLTS trainer module was successfully implemented and is suitable as a learning medium to help students understand solar energy systems through direct practical experience.

Keywords: Solar Power Plant (PLTS), trainer module, renewable energy, learning media, Solar Charge Controller.